

# PATENT SPECIFICATION

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## (54) IMPROVEMENTS RELATING TO SECURITY LOCK SYSTEMS

(71) We EMI LIMITED a British company, of Blyth Road, Hayes, Middlesex, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to security lock systems and is especially, though not exclusively, applicable to buildings protected by burglar alarm systems.

When a burglar alarm system in a building gives an alarm to the police, the police contact the alarm system rental company who are entrusted with a duplicate key to the building. The company then radiotelephones one of their mobile vans telling the driver to call at the company offices to collect the key and to convey it to the building, the intention being that the police and the mobile van meet at the building and the police are allowed entry. This procedure is adopted because most alarms are false alarms and it is considered a security risk for each company van to carry a set of keys to all the buildings protected by alarm systems, but the procedure ensures the police are present when protected premises are entered by alarm company employees. However, the procedure is relatively slow and the mobile van typically may have to travel twenty miles via the company office before reaching the building. Hence the police may be hindered in their attempts to determine the cause of the alarm.

An object of the present invention is to provide a security lock system to avoid the security risk incurred in carrying an identified key for a lock of the system while removing the need to go to a central office to obtain a key to a lock at a remote location.

According to one aspect of the invention there is provided a security lock system including a plurality of locks at locations remote from a central station and at each of

the plurality of locks of the system a key discriminator settable to be only operable to release the associated lock providing security at a respective remote location by a key of specific form defined in information stored at the central station of the system, means to transmit from the central station to the respective remote location a coded signal defining the specific form of key to which the key discriminator at the location is set, means transportable to the remote location to receive the signal, to decode the signal to define the specific form of key to which the key discriminator at the location is set, and to create this specific form of key at the remote location for presentation to said discriminator to release the lock.

According to another aspect of the invention there is provided a security lock system including a plurality of locks at locations remote from a central station and at each of the plurality of locks of the system a key discriminator settable to be only operable to release the associated lock providing security at a respective remote location by a key of specific form defined in information stored at the central station of the system, a group of keys including keys of each distinct form in the system, each key having an arbitrary identification of its form which identification is also recorded at the central station, means to transmit to individual said remote locations a signal conveying the arbitrary identification of the respective key form to which the key discriminator at the location is set, means to receive said signal and provide said arbitrary identification in a manner which a holder of said group of keys can use to select therefrom said key of specific form for presentation to said discriminator to release the lock.

In order that the invention may be fully understood and readily carried into effect, it will now be described with reference to the drawings filed with the Provisional Specification of which:—

Figure 1 shows a contact breaker set,

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Figure 2 shows a block diagram of one example of a key discriminator device, and

Figure 3 shows an example of such a key discriminator device.

5 Referring to a contact breaker set as shown in Figure 1, Figure 1A shows the set in an unactuated state. All components are electrically conductive except for the insulated push rods 1 and 1A. Members 3 and 4 may be constructed from spring steel and hence when the set is actuated by applying force to one or both push rods 1 and 1A, member 3 or/and 4 transfer(s) its/their contact(s) between members 5 and 5A. Releasing the force applied to a push rod or rods will allow the set to return to its previous state. Figure 1B shows rod 1 depressed and member 3 engaged in contact with member 5A. It is apparent that electrical continuity between points X and Y is established if either of push rods 1 or 1A is operated, but not if neither or both push rods is/are operated.

A key discriminator device may be constructed by wiring several pairs of contact breaker sets of the type described above in series and a combination code may be set on the device by operating some of the series of push rods 1A. Continuity along the circuit will only be established by operating all the rods 1 which correspond to unactuated rods 1A. Any single error will break the circuit.

The rods may be operated by two punched cards as will be described with reference to Figure 3. The contact breaker sets connected in series are housed in a secure box 16 and the series of push rods 15 (corresponding to rod 1 of Figure 1) protrude from the surface 21 of box 16. A flap 12 is attached to box 16 by a hinge 20 so it may fold against the surface 21, rods 15 being accommodated in a groove 13 so that no pressure is applied by flap 12 on the rods. The other series of push rods (corresponding to rods 1A of Figure 1) protrude from the rear of box 16 and are covered by a flap 18 similar to flap 12. A key comprising a card 11 with a line of punched holes 22 is presented to the system by placing it in recess 14 of flap 12 and closing the flap. The card is so arranged that some of rods 15 will pass through the punched holes while other rods will be displaced inwards by the card where no holes are present. A similar card is placed under flap 18 which remains locked against box 16 and this card determines the pattern of holes required on key 11. The correct key has an absence of holes in line 22 corresponding to each hole in the card under flap 18. The combination of the lock may be readily changed by changing the card under flap 18.

65 A block diagram of the circuits which

comprise the key discriminator device are shown in Figure 2. Electrical power from a source 10, typically a burglar alarm source, is applied to the card sensors 6, comprising the plurality of circuit breakers in series. An activating switch 7, is operated by a plunger 19 (see Figure 3) when flap 12 is closed. Circuits 7 of Figure 2 permit a card to be presented once only in flap 12. Switch 8 remains open unless the burglar alarm system has been triggered in the building. Thus only if the alarm sounds, and the correct key is presented first time to the system, a current will flow through solenoid 9 which may typically operate a keep for the bolt of a lock and open a door. It will be apparent that other examples and embodiments of the key discrimination device lie within the scope of the invention, which may be capable of comparing for example magnetic keys or chains of binary or other electrical pulses with pre-programmed information.

Box 16 of Figure 3 may be mounted remotely from the door and be connected by cable 17. The box 16 may be of the size of a building brick and be incorporated in a wall.

In operation of the system, each mobile van carries a group of a large number of punched card keys, each like card being assigned a number which is different for each van. The driver of a particular van may be told, by radiotelephone, the number of the card in the particular group required for a particular key discrimination device and this number will be of no relevance to any other van.

Alternatively, a card punching device may be installed in each van so that a key may be formed on the receipt of coded information radio signals from the company office.

Instead of using punched cards as keys, a code may be transmitted from the company office via the radio link to the van and recorded, for example magnetically on a suitable carrier medium inserted by the van driver into a recording device connected to the van receiver. The circuits of the recording device include circuits which modify the code received in a manner peculiar to each van, for example by inverting certain digits before recording. The code sequence transmitted by the company office is thus in such a form that only a selected van is capable of recording the requisite code for a given lock on the carrier medium. The driver then inserts the recorded carrier medium into a magnetic reader near the door in the building. Logic circuits within the protected premises and forming the key discriminator for the associated lock compare the code recorded on the carrier medium with pre-programmed

information set in the circuits by a patch panel or other suitable means, and energise the keep solenoid as described above if the recorded information and the pre-programmed information correspond in a predetermined manner. At the same time, the aforementioned reader is arranged to retain or destroy the recorded carrier medium or to obliterate the recorded code so that the recorded medium is not reusable. The carrier medium may comprise a badge of magnetically susceptible material worn by the driver of the van. Alternatively the coded information received from the company office may be recorded on a magnetic tape, typically on a cassette recorder; the key discriminator associated with a lock is thus designed to replay the cassette and otherwise operates as before. The cassette may be replayed in the van and signals applied via a cable to the discriminator of the lock, or the discriminator of the lock may receive signals direct via the van radio and logic circuits with an electrical cable connecting the van and lock.

#### WHAT WE CLAIM IS:—

1. A security lock system including a plurality of locks at locations remote from a central station and at each of the plurality of locks of the system a key discriminator settable to be only operable to release the associated lock providing security at a respective remote location by a key of specific form defined in information stored at the central station of the system, means to transmit from the central station to the respective remote location a coded signal defining the specific form of key to which the key discriminator at the location is set, means transportable to the remote location to receive the signal, to decode the signal to define the specific form of key to which the key discriminator at the location is set, and to create this specific form of key at the remote location for presentation to said discriminator to release the lock.

2. A system according to Claim 1 wherein said transmitting means includes a radio transmitter and said receiving means includes a radio receiver for receiving signals from said transmitter, logic circuits for transforming received signals in accordance with a pre-determined code and a transducer responsive to the transformed signals to provide the defined form of key.

3. A system according to Claim 2 wherein the defined form of key is provided by placing a key of undefined form in said transducer which thereby applies the defined form to said key.

4. A system according to Claim 3 in which the transducer is a card puncher and the key a punched card for application to the key discriminator.

5. A security lock system including a plurality of locks at locations remote from a central station and at each of the plurality of locks of the system a key discriminator settable to be only operable to release the associated lock providing security at a respective remote location by a key of specific form defined in information stored at the central station of the system, a group of keys including keys of each distinct from in the system, each key having an arbitrary identification of its form which identification is also recorded at the central station, means to transmit to individual said remote locations a signal conveying the arbitrary identification of the respective key form to which the key discriminator at the location is set, means to receive said signal and provide said arbitrary identification in a manner which a holder of said group of keys can use to select therefrom said key of specific form for presentation to said discriminator to release the lock.

6. A system according to any one of Claims 1 to 5 in which the key discriminator includes a plurality of contact breaker sets connected in series, a first group of said sets arranged for operation by a first setting key secured within said discriminator and the remainder of said sets operable by the insertion of a releasing key of the defined form determined by said setting key, the operation of all said sets producing a recognition signal to release said lock.

7. A system according to Claim 6 in which the setting key and releasing key are punched cards having complementary areas punched out and not punched out.

8. A system according to Claim 2 in which the transducer is a magnetic recorder to provide a record on a magnetic medium of the defined key form for application to the key discriminator to release said lock.

9. A system according to any preceding claim including means for inhibiting said key discriminator except in response to a burglar alarm signal.

10. A system according to any preceding claim in which said key discriminator releases said lock via a solenoid operable to release the keep of said lock.

11. A system according to Claim 1 in which the means to provide the defined key form includes an electrical connector and associated conductors to mate with a connector of said discriminator to supply thereto said defined key form as an electrical signal to release the lock.

12. A security lock system substantially as herein described with reference to Figures 1, 2 and 3 of the drawings filed with the Provisional Specification.

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